

BelastinGPT

AI in het dagelijks leven van een
belastingadviseur

18 April 2024

Your Prompt Master for today...



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Agenda

- 1** GenAI Fundamentals
- 2** GenAI & Tax
- 3** Tax Use Cases
- 4** M365 Copilot
- 5** The Fine Print
- 6** Prompt Engineering
- 7** Next Steps

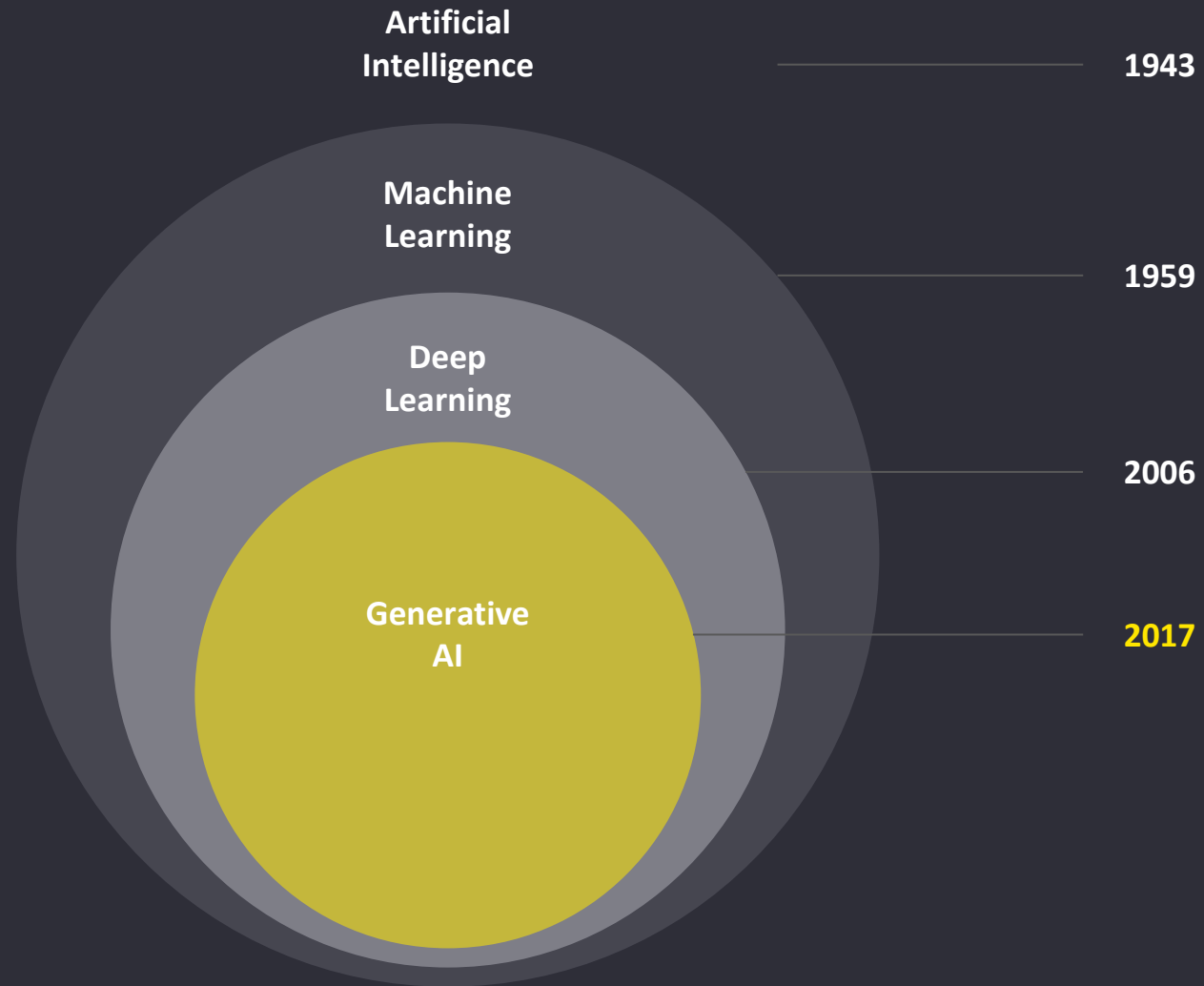


01

GenAI Fundamentals



It's been a long road... but we're just at the beginning



A little bit of everything in the mix

Dataset	Quantity (tokens)	Weight in training mix	Epochs elapsed when training for 300B tokens
Common Crawl (filtered)	410 billion	60%	0.44
WebText2	19 billion	22%	2.9
Books1	12 billion	8%	1.9
Books2	55 billion	8%	0.43
Wikipedia	3 billion	3%	3.4

I don't understand a word you're saying...

GPT-3 Codex

Is ChatGPT your new Tax Advisor?

Clear

Show example

Tokens

9

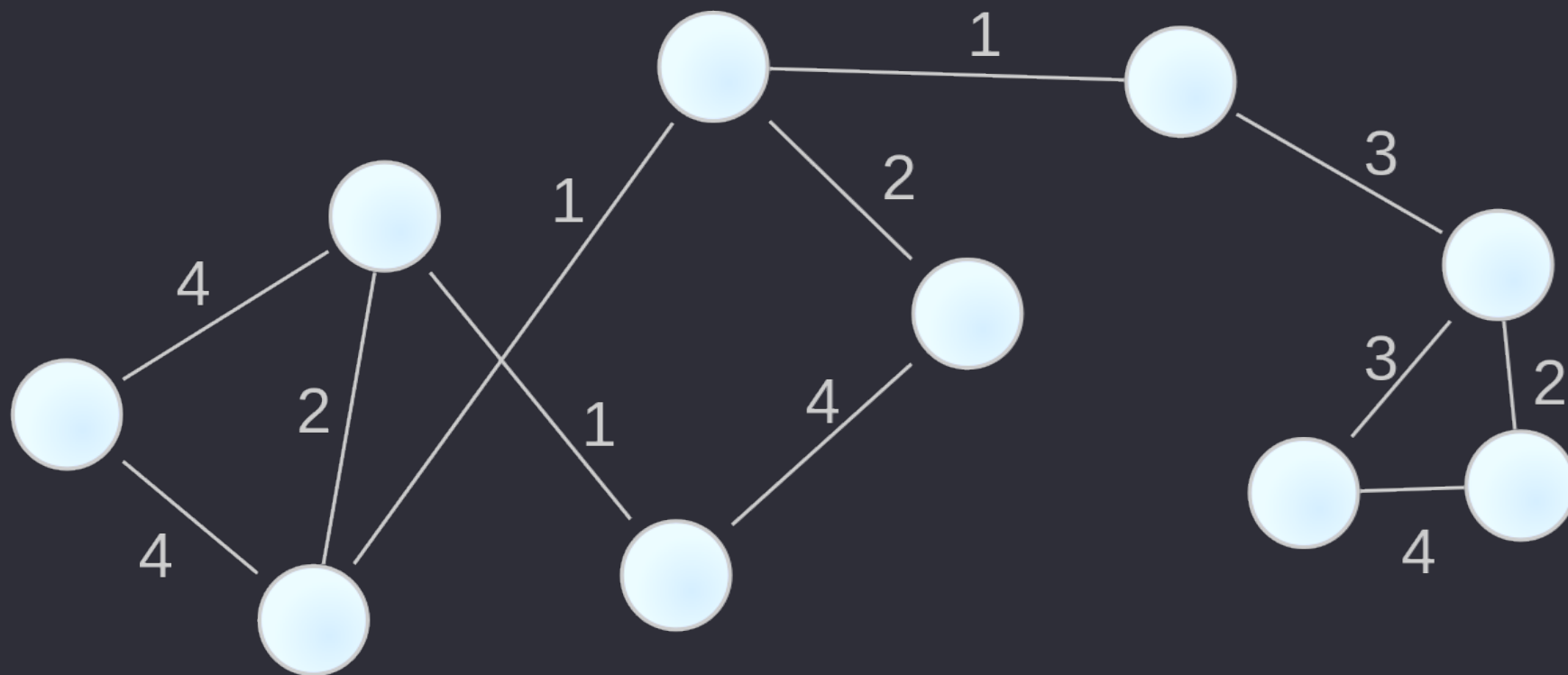
Characters

32

Is ChatGPT your new Tax Advisor?

[3792, 8537, 70, 457, 534, 649, 1687, 20685, 30]

175b parameters (weights) in GPT-3s artificial neural network



Large, larger, larger, larger, larger ...



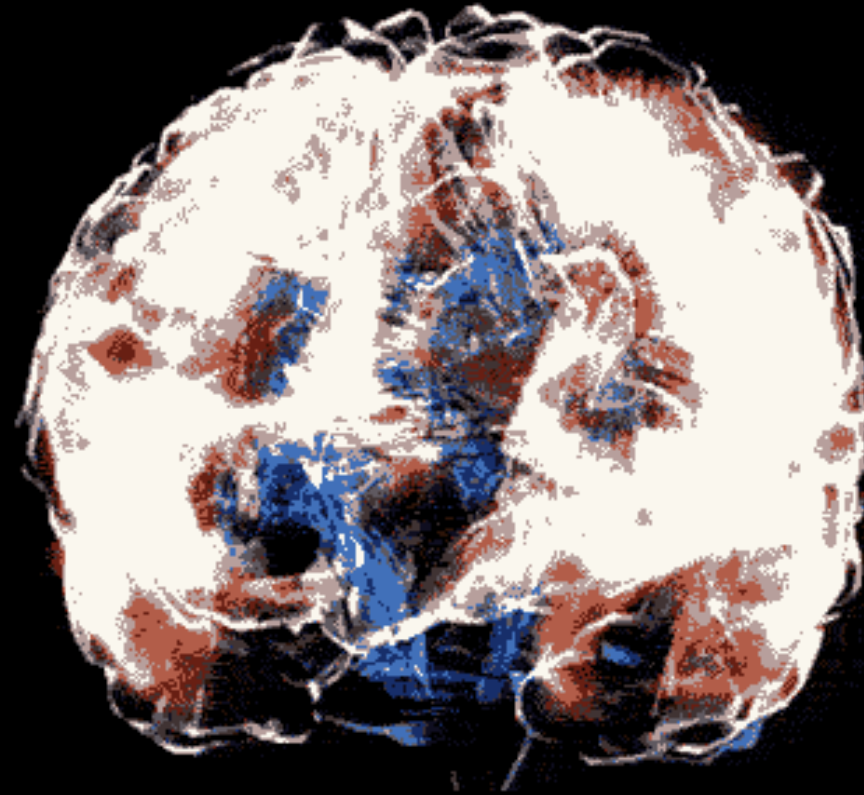
1.500.000.000
GPT-2

175.000.000.000
GPT-3

1.760.000.000.000
GPT-4



Use it well...



86b neurons

x 1,000 connections

= **100 trillion neural connections**

At the brink of a transformative technological era

Advantages

Increased efficiency

Microsoft reports **55% less programming** time, MIT cites **44%-time savings** in professional writing tasks.

Increased creativity

57% of consumers anticipate GenAI enhancing creativity, while **34% of GenAI patents** are linked to image generation.

Improved experiences

72% of global consumers foresee GenAI enhancing customer experiences, while **ChatGPT scores in the 90th percentile** on the Bar.

Barriers

Despite numerous advantages, GenAI presents issues.
How will you strategically navigate and overcome these obstacles?



Just a hype?

WSJ The Wall Street Journal

Businesses Aim to Harness Generative AI to Shake Up Accounting, Finance

Generative AI could eliminate many of the tasks long done by accountants and auditors, resulting in the automated generation of reports,...

Baker Institute
<https://www.bakerinstitute.org>

AI and Taxes — A Work in Progress: Part 1

23 ago 2023 — This first brief reviews the impact of current AI developments on tax research and compliance, and the second brief discusses recent efforts to ...

How can accountants harness artificial intelligence?

How AI can help tax and accounting professionals attain their goals

The future of work is rapidly changing, driven by the emergence of Artificial intelligence (AI) and generative AI technologies that are...

1 month ago

Forbes

Generative AI: Predicting The Tax Department's Next Best Move

AI will not only lead to more informed decision-making with taxes but can also help automate routine tasks, identify potential tax risks, ensure...

Aug 23, 2023

Forbes
<https://www.forbes.com>

TaxGPT: Advancing AI And The Tax Profession

14 jun 2023 — Robert Goulder, Benjamin Alarie, and Susan Massey discuss the benefits and drawbacks of using generative AI models to assist with ...

ICAEW
<https://www.icaew.com>

The implications of AI for tax practitioners

9 may 2023 — The **implications of AI for tax practitioners**. Author: ICAEW Insights. Published: 09 May 2023. SHARE THIS ...

Generative AI: Transforming The Future Of Finance

Founder & CEO of UNFOLD + The Academy of Tomorrow. World-renowned Futurist Keynote Speaker, empowering leaders to drive transformation.

Sep 5, 2023

Forbes
<https://www.forbes.com>

AI And Tax Operations: How To Get Started

15 jun 2023 — AI can streamline **tax operations** by automating tedious tasks such as data entry and compliance checks. It can also help businesses **gain insights** ...

The implications of AI for tax practitioners

How generative AI can help finance and accounting professionals

How AI will impact the Tax profession?

Artificial intelligence will re-engineer the tax function, and it won't be just the business that benefits – its deployment is likely to attract more recruits to the profession

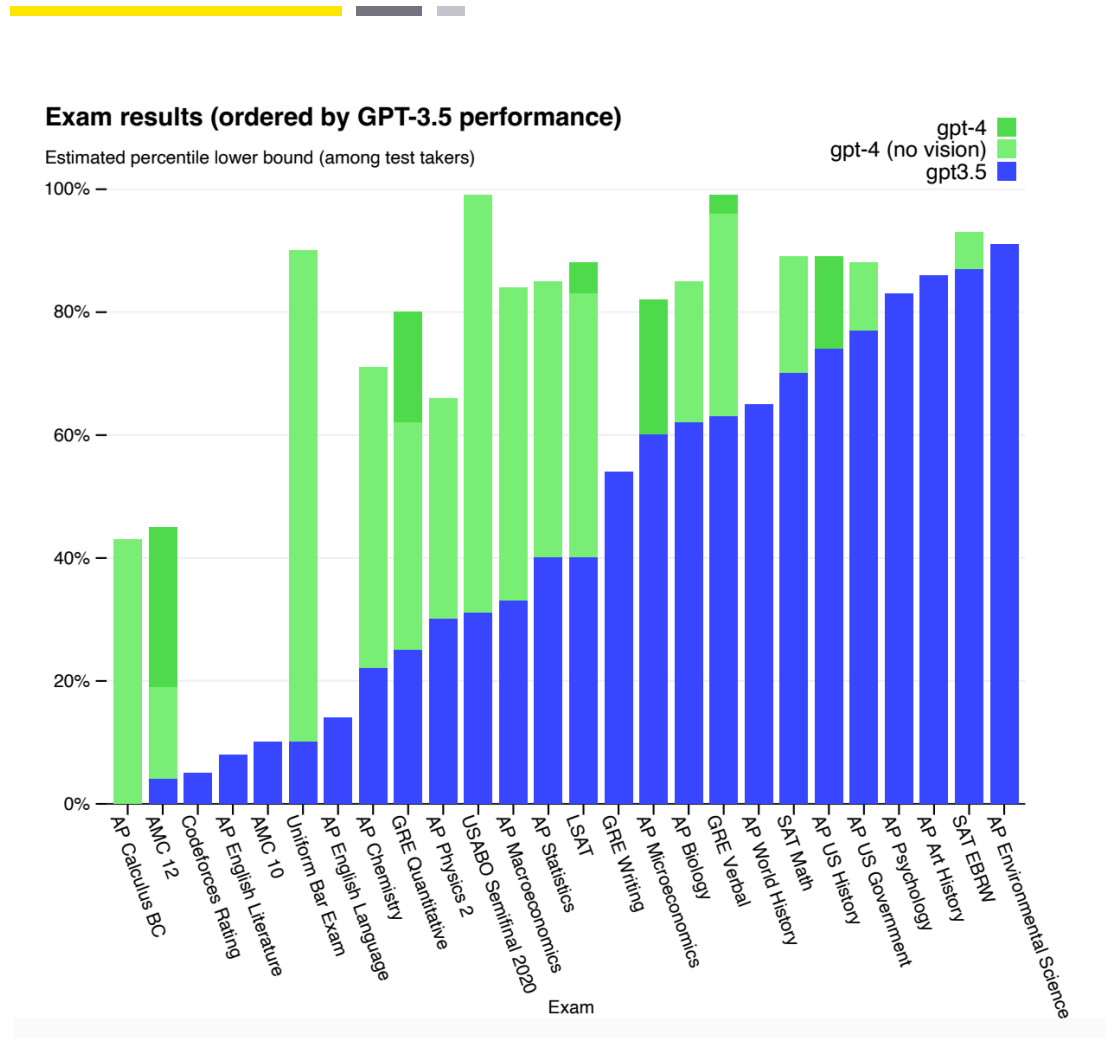
The Evolving Tax Profession: How Generative AI is Reshaping Public Accounting

Are we ready for the profound impact of generative AI on accounting and finance? Here's what lies ahead

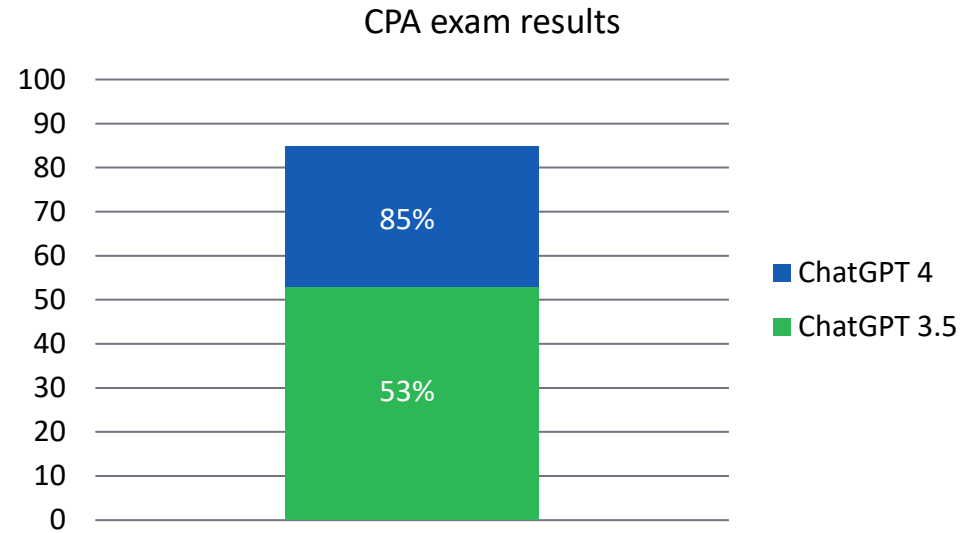
Generative AI will have a profoundly disruptive impact on accounting and finance, but that doesn't necessarily mean job loss.

The Rise of Generative AI for Tax Research

ChatGPT is passing the hardest exams



Source: GPT-4 Technical Report, Open AI- [gpt-4.pdf](https://openai.com/research/gpt-4) (openai.com)



Is it All Hype? ChatGPT's Performance and Disruptive Potential in the Accounting and Auditing Industries

Source:
 Eulerich, Marc and Sanatizadeh, Aida and Vakilzadeh, Hamid and Wood, David A.,
 Is it All Hype? ChatGPT's Performance and Disruptive Potential in the Accounting
 and Auditing Industries (November 17, 2023).
 Available at SSRN or <http://dx.doi.org/10.2139/ssrn.4452175>

Contract Review: Junior Lawyers vs. LPO vs. GenAI

Better Call GPT, Comparing Large Language Models Against Lawyers

LAUREN MARTIN, NICK WHITEHOUSE, STEPHANIE YIU, LIZZIE CATTERSON, RIVINDU PERERA, AI Center of Excellence, Onit Inc., New Zealand

This paper presents a groundbreaking comparison between Large Language Models (LLMs) and traditional legal contract reviewers—Junior Lawyers and Legal Process Outsourcers (LPOs). We dissect whether LLMs can outperform humans in accuracy, speed, and cost-efficiency during contract review. Our empirical analysis benchmarks LLMs against a ground truth set by Senior Lawyers, uncovering that advanced models match or exceed human accuracy in determining legal issues. In speed, LLMs complete reviews in mere seconds, eclipsing the hours required by their human counterparts. Cost-wise, LLMs operate at a fraction of the price, offering a staggering 99.97 percent reduction in cost over traditional methods. These results are not just statistics—they signal a seismic shift in legal practice. LLMs stand poised to disrupt the legal industry, enhancing accessibility and efficiency of legal services. Our research asserts that the era of LLM dominance in legal contract review is upon us, challenging the status quo and calling for a reimagined future of legal workflows.

CCS Concepts: • **Computing methodologies** → **Natural language generation; Information extraction; Applied computing** → **Law; Document searching.**

Additional Key Words and Phrases: Generative AI, Large Language Models, LegalAI, NLP

Reference For
Lauren Martin,
Models Against

1 INTRODUCTION

The integration of the current addressing the discovery of L manage the in deep, context

To address of the perform their perform legal tasks are by LLMs, raise quality, accur

Author's address: Zealand, lauren.m

Key results:



- **LPO (slightly) > GenAI > Juniors** in locating and determining legal issues

- **But GenAI** completed review

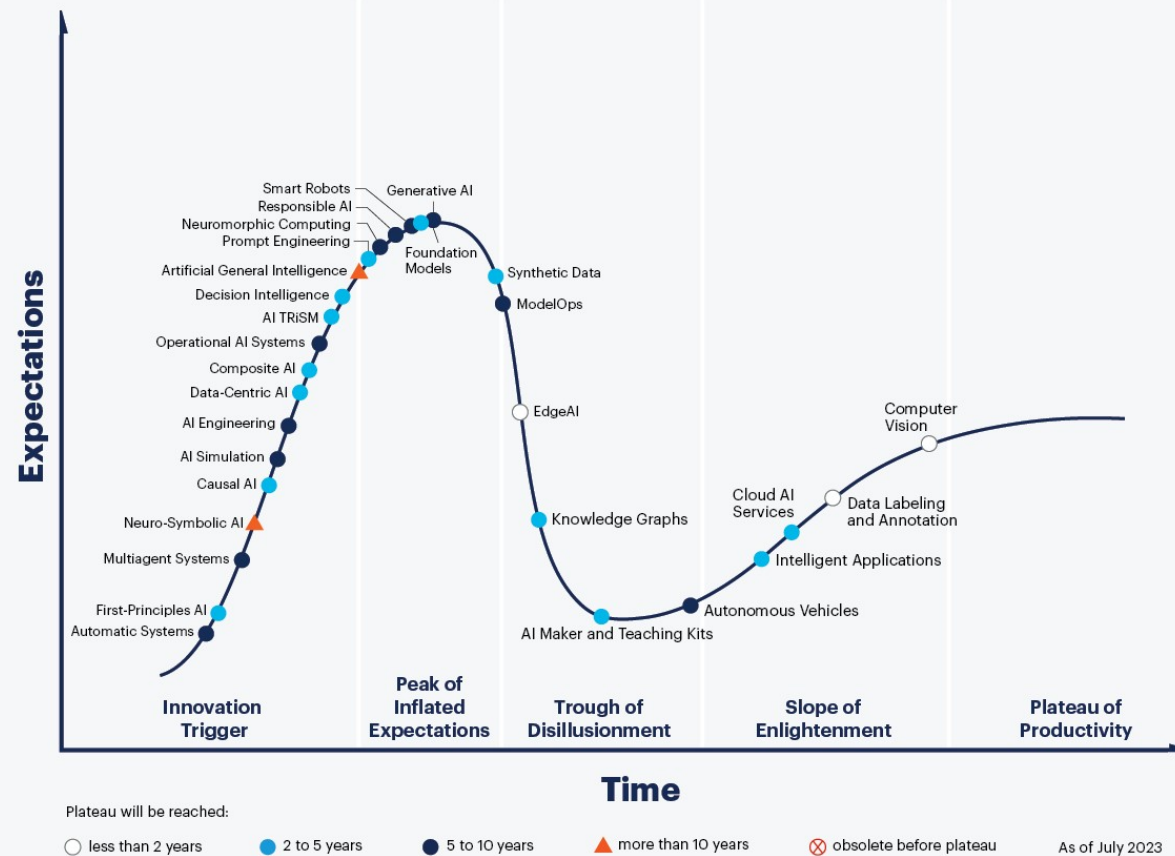
- **+90% faster** and
- **300x cheaper**



Source: <https://arxiv.org/html/2401.16212v1>

Technology developments all follow a similar pattern...

Hype Cycle for Artificial Intelligence, 2023



[gartner.com](https://www.gartner.com)

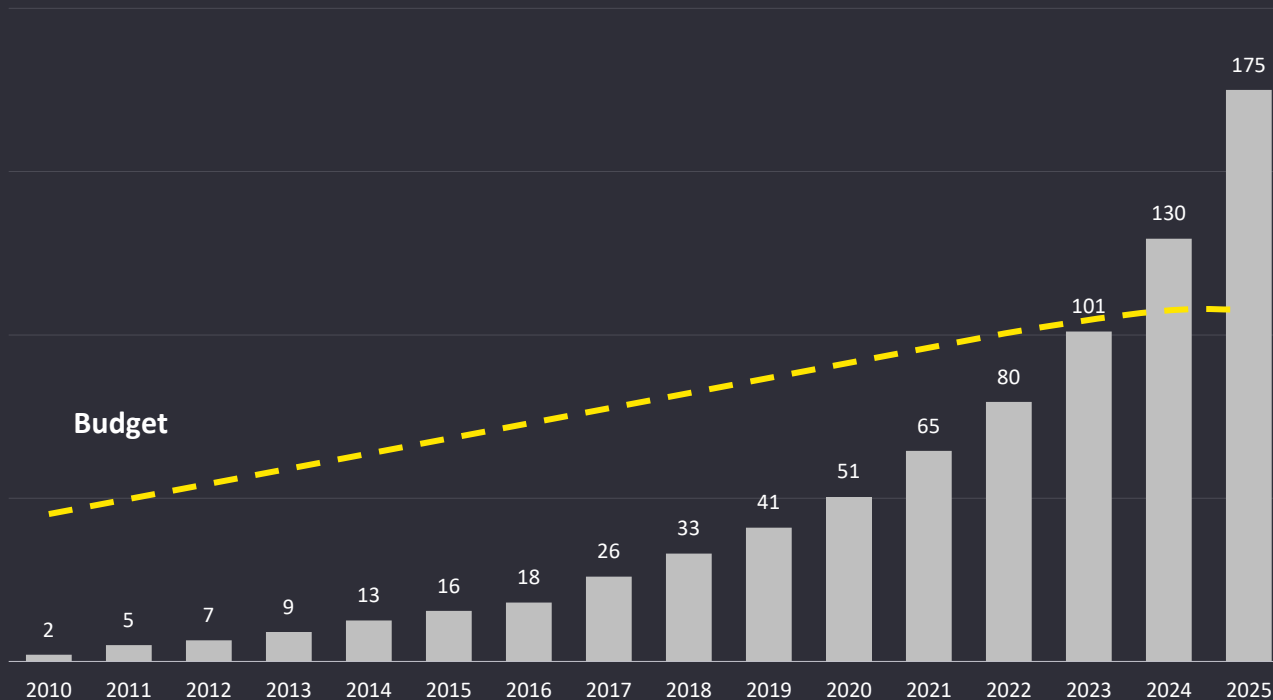
Source: Gartner
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Gartner

Data boom – we're only getting busier....



Estimated worldwide data volume in zettabytes



2023 EY Tax Finance Operate (TFO) survey

72% of time spent on routine activities like data collection, transformation, and cleansing

89% of surveyed companies plan to freeze or reduce tax and finance function budget



02

GenAI & Tax

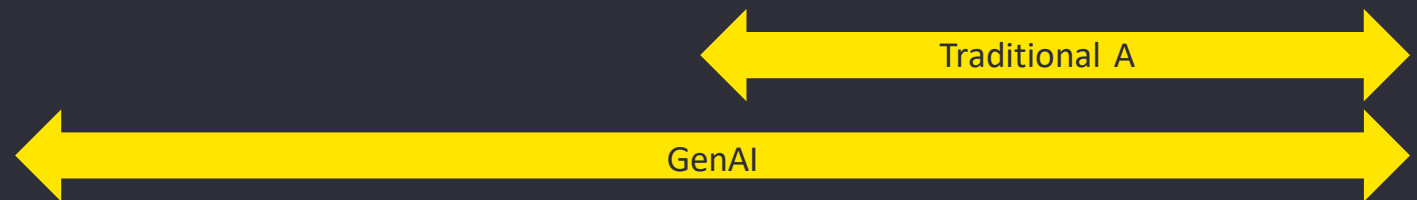
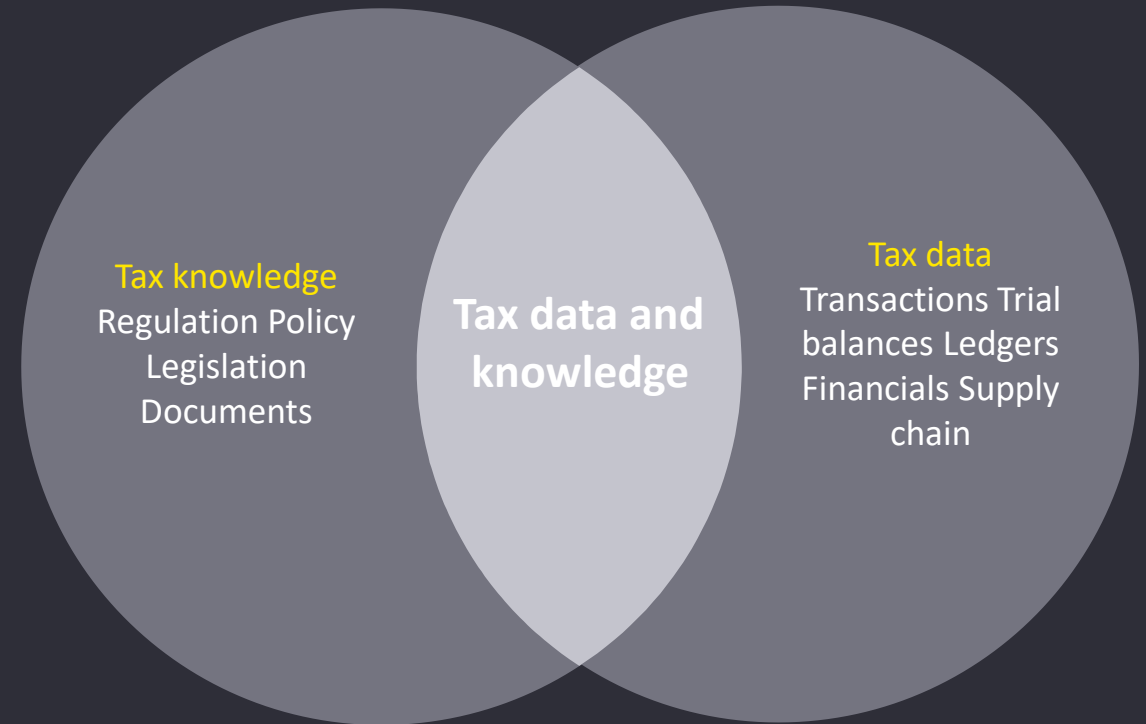


EY Tax AI acceleration strategy



Why this is so revolutionary for tax

Gen AI creates opportunities for tax functions to develop **AI Augmented Tax Professionals** as they harness the power of automation across the two key domains of Tax:
Knowledge and Data



Foundational AI capabilities for Tax

Knowledge engineering

Search, retrieve and make sense of knowledge from a variety of data sources

“

How does our ETR trend compare to our competition, based on all our historical filings?”

“What tax advice have we historically provided to BUs in Germany between Jan 2018 and July 2019?”

Document analysis

Analyse and summarise new data

“

Read this intercompany agreement and determine whether it adheres to our latest Group transfer pricing policy”

“Read the Spanish FTT regulations and summarise key compliance obligations in order of urgency of compliance deadlines

Content generation

Create new content based on knowledge and insights

“

Update last year’s tax disclosure with this year’s latest tax provision results

Draft a controls framework document for Corporate Income Tax Reporting under US GAAP”

Data engineering

Create and manage data flows to move, transform and cleanse information

“

Create a new table that combines the vendor names from the supplier database and the tax identification number from the Tax database

Reconcile data set A with data set B and provide thematic summary of key reconciliation errors.

The art of the possible – bringing knowledge and data together

Tax Data Management

- ▶ Tax data mapping assistant
- ▶ Automated data entry
- ▶ Data visualization (AI enabled domain specific dashboards)
- ▶ Transaction categorization
- ▶ Tax document digitalization

Tax Knowledge Augmentation

- ▶ Domain specific chatbots (payroll tax guide, transfer pricing regulation bot)
- ▶ Upskilling solutions
- ▶ (coding for tax assistant, personalized learning solutions)
- ▶ Expertise capture
- ▶ (LLM that captures the knowhow of key individuals within an organization)



Tax AI Process Transformation

- ▶ Report generation
- ▶ (draft domain specific returns)
- ▶ Document AI
- ▶ (transfer pricing report, draft agreements)
- ▶ AI-augmented process agents (cost allocation modelling, translation)
- ▶ Next-best action / recommender systems

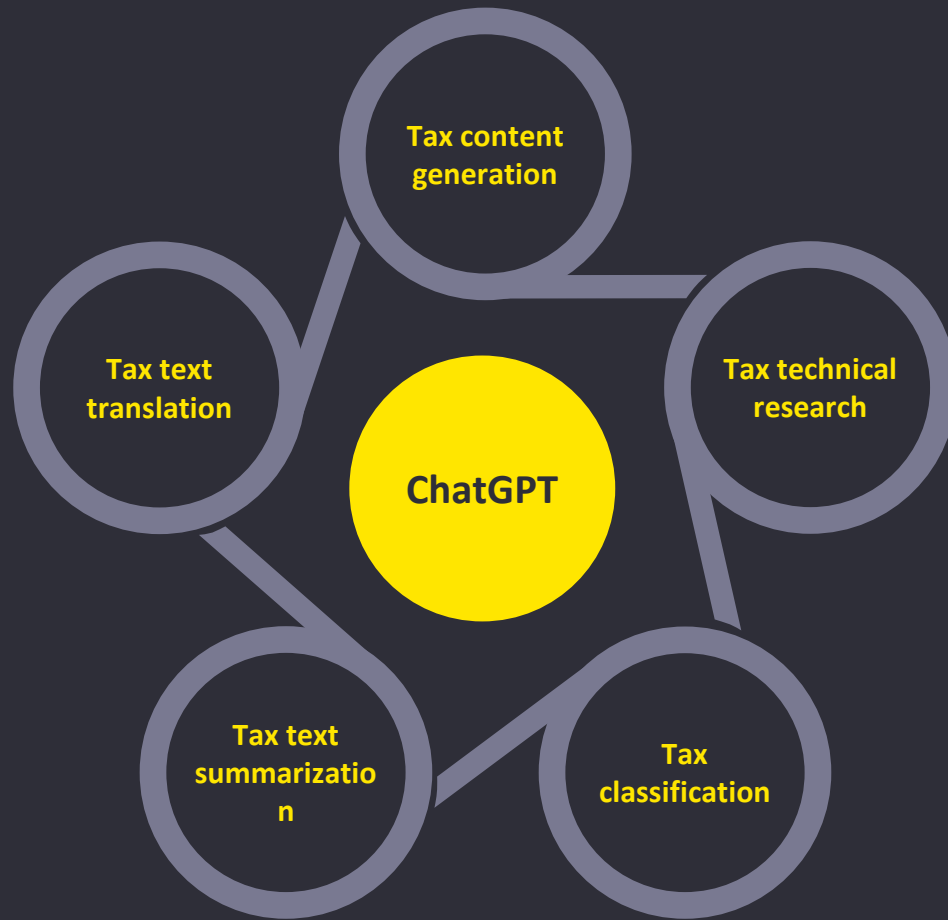
Tax Policy and Risk Management

- ▶ Early detection tools
- ▶ (e.g., BEPS 2.0, case law, country specific requirement identification, etc.)
- ▶ Predictive planning analysis
- ▶ Scenario modeling
- ▶ (EPS impact, planning impact)
- ▶ Tax data anomaly detection
- ▶ Tax quality assurance bot

Responsible AI and Governance

Tax AI Strategy

Delegating tax tasks to ChatGPT



Gathering input

We ran the experiment with representatives from direct tax, international tax, compliance, indirect tax, payroll tax and transfer pricing. We asked them to provide us with tasks (in natural language) for ChatGPT for each of the selected use cases, the same way that they would delegate tasks to “normal” team members. We leveraged synthetic (non-client) data for the experiment.

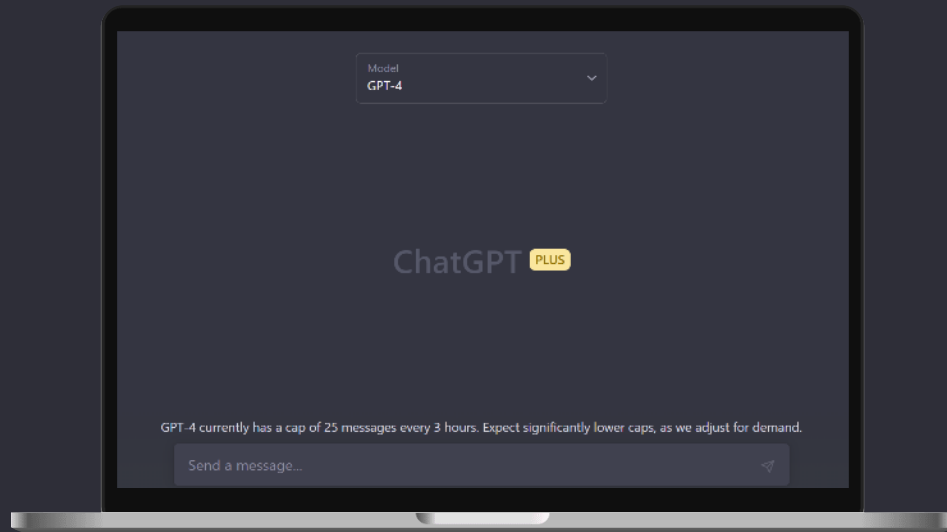
Example tasks

- ▶ **Generate** a pro-forma objection CIT, information request for debt capacity analysis, advice on the eigenwoningregeling, 30% facility and VAT reverse charge mechanism.
- ▶ **Translate** newsalerts about Pillar 2, Slovakian VAT Ledger Statements, real estate entities and payroll updates
- ▶ **Summarize** text related to DEBRA, tax interest, CAOs, e-invoicing and art. 10a CITA
- ▶ **Research** substance requirements, the participation exemption, the KIA, social security consequences, operational margins and Austrian Kammerumlages
- ▶ **Classify** costs as maintenance/improvements, werkkosten, intrastatcodes and financial instruments based on their characteristics.

Experiment and review

Executing the experiment

We executed the delegated tasks centrally using ChatGPT Plus (model GPT-4) as available on the website of OpenAI and sent the input back to the SSL representatives for review. As a review framework, we selected an expanded version of the ISO/IEC 25012 model for Data Quality. We asked the reviewers to score the output from ChatGPT (scale of 1-10) on each of the metrics depicted on the right.



Selected ISO/IEC 25012 metrics

1 Correctness

2 Credibility

3 Currentness

4 Precision

5 Traceability

6 Completeness

7 Understandability

8 Consistency

9 Representational

10 Value Added

Some quotes...

“

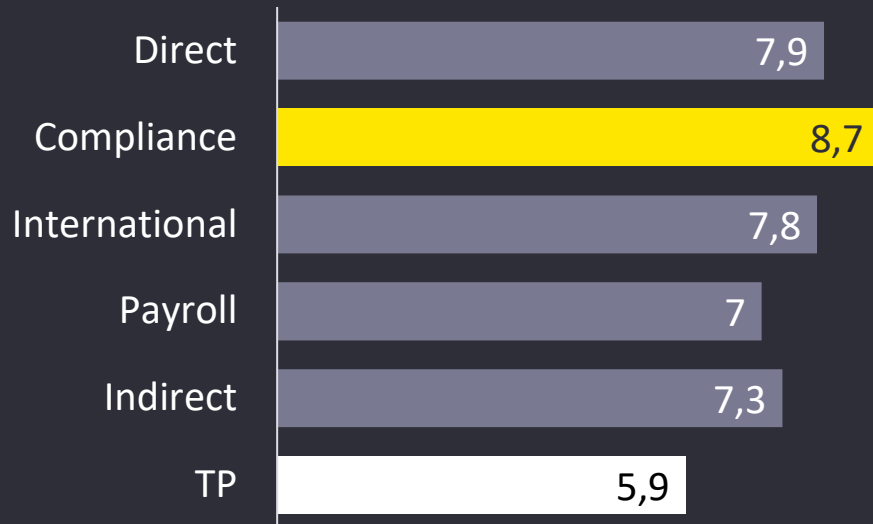
The future is here, we can retire early. I can forward this output almost 1-1 to a client

“

The AI uses the correct terminology, but in the wrong context: it's a jack-of-all-trades, but a master of none

Results per competency and use case

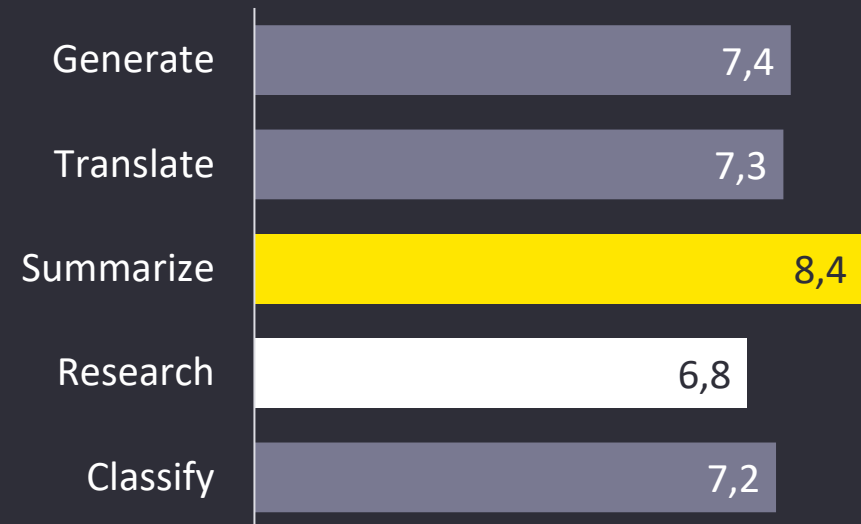
Per competency



“

It seems to be better at routine tasks, of which more of examples were present in GPT's training set

Per use case

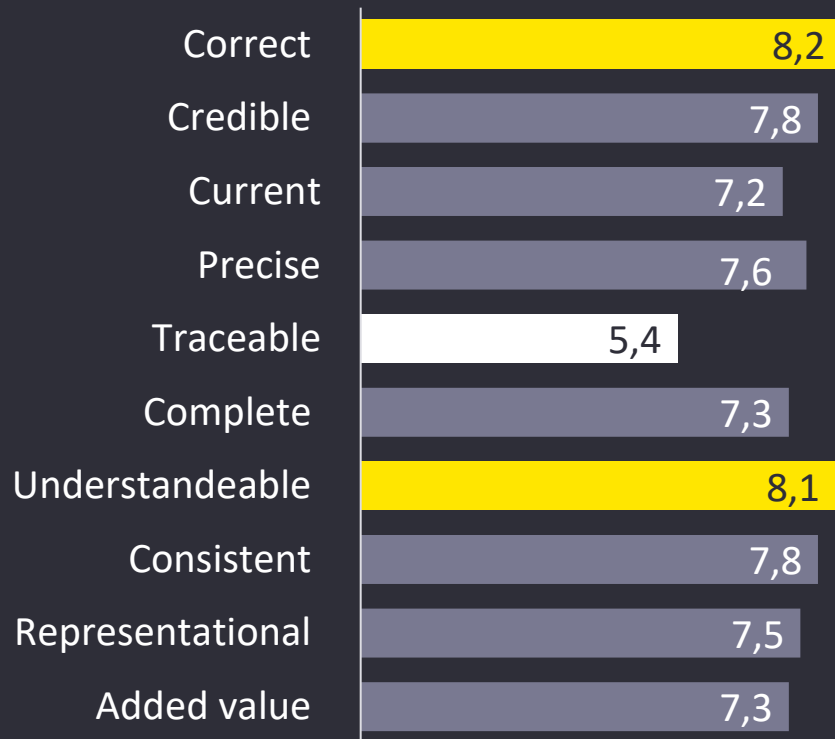


“

The data in GPT's training set was outdated (Sept. 2021), which resulted in important research errors

Results per data quality metric

Per data quality metric



“

ChatGPT writes in a nice, understandable way without spelling errors

“

ChatGPT does however not automatically include sources for its output, and when it does these are often incorrect/nonsensical

Augmenting the potential of tax professionals

Our strategic thinking must flip

From

People executing **Processes** powered by **Technology and Data**



To

Technology powered by **Data** executing **Processes** managed by **People** asking questions and reviewing

- Seamless human-AI collaboration will achieve extraordinary outcomes
- Unlocking the full potential of AI to augment the human experience of tax professionals

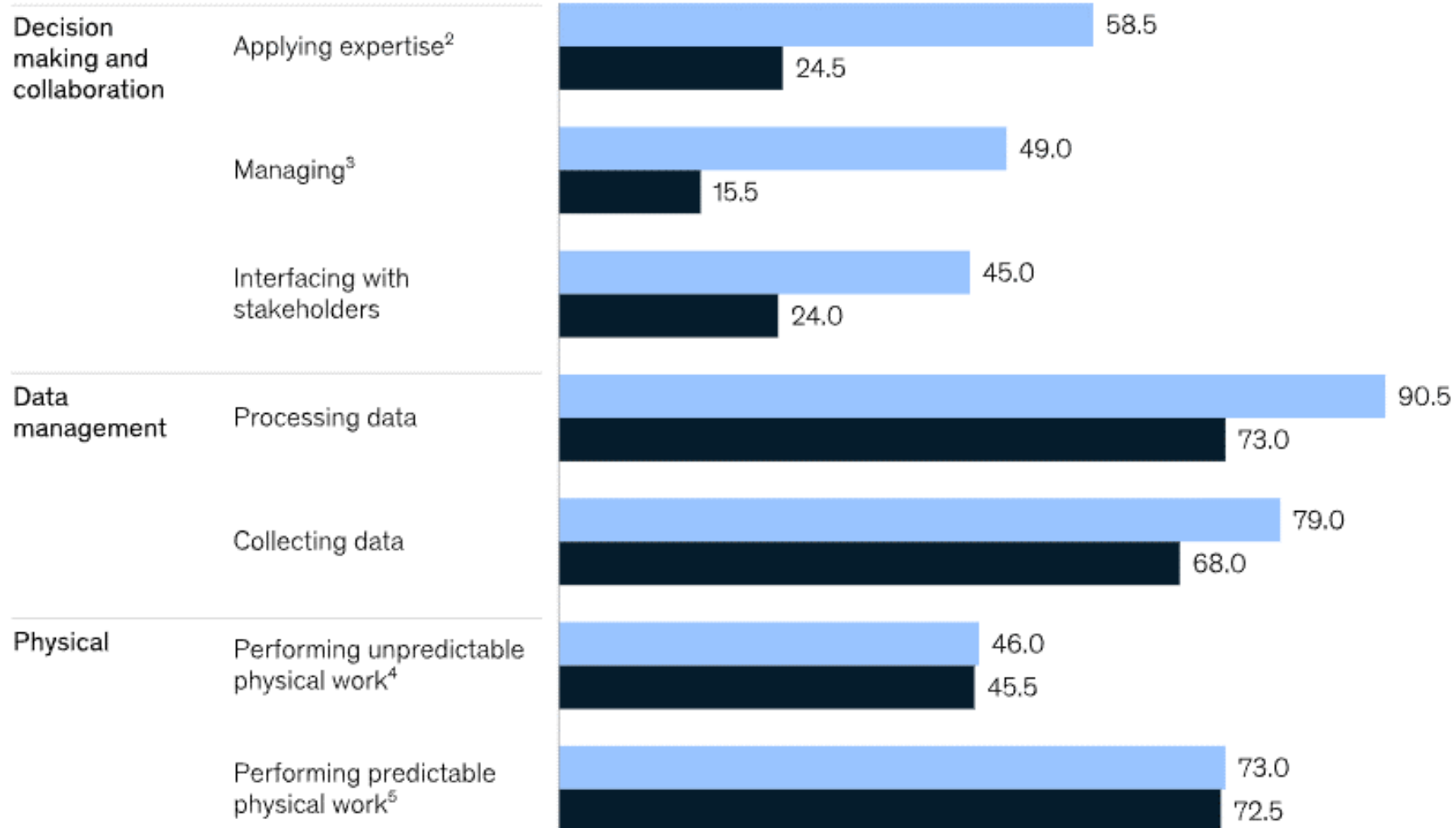
“

... more symbiotic relationship between humans and computing

Satya Nadela, CEO, Microsoft, March 2023

Automation potential per activity group

■ With generative AI
■ Without generative AI¹



“

Tax professionals who use AI technology are going to replace tax professionals who don't.

Benjamin Alarie

Founder and CEO, Blue J



03

Tax Use Cases



Phased developments

Predictive analysis and advisory
(TaxAdvisorGPT)

4

From raw data to Tax return
(ERPTaxGPT)

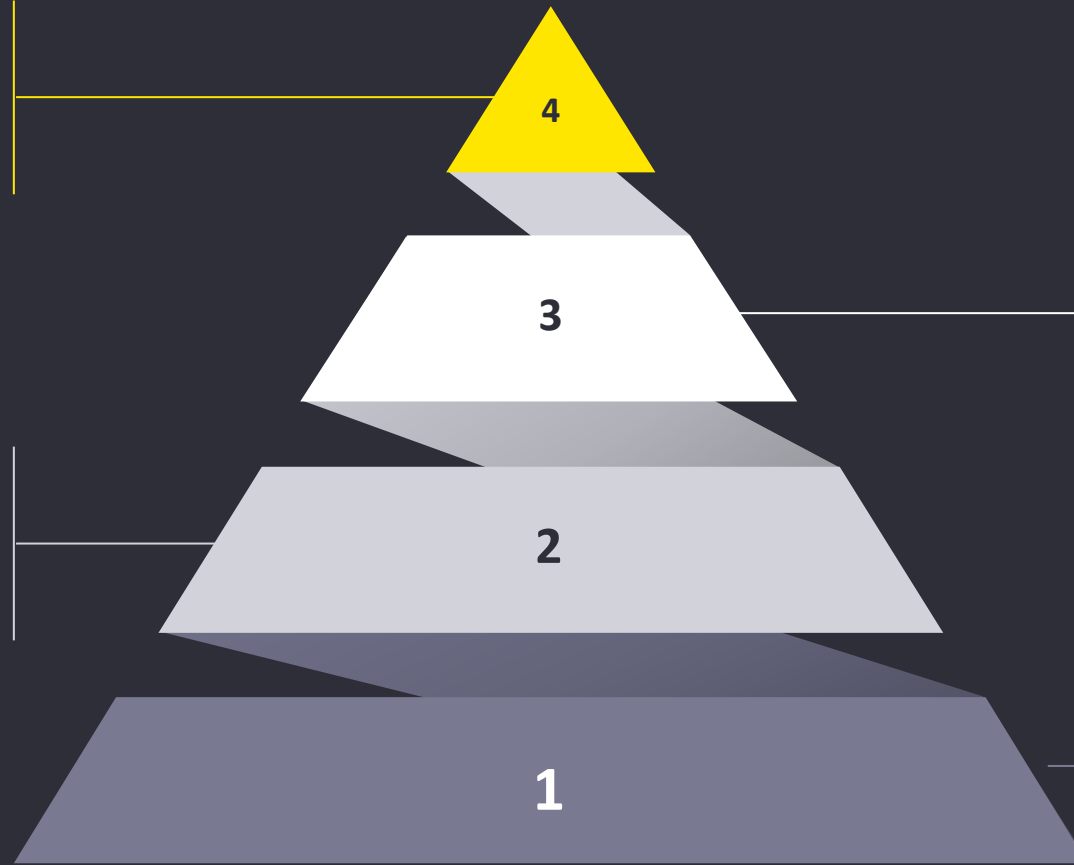
3

Tax deliverable preparation and data analysis
(TaxKnowledgeGPT)

2

Automation / AI assistant
(Tax CoPilot)

1

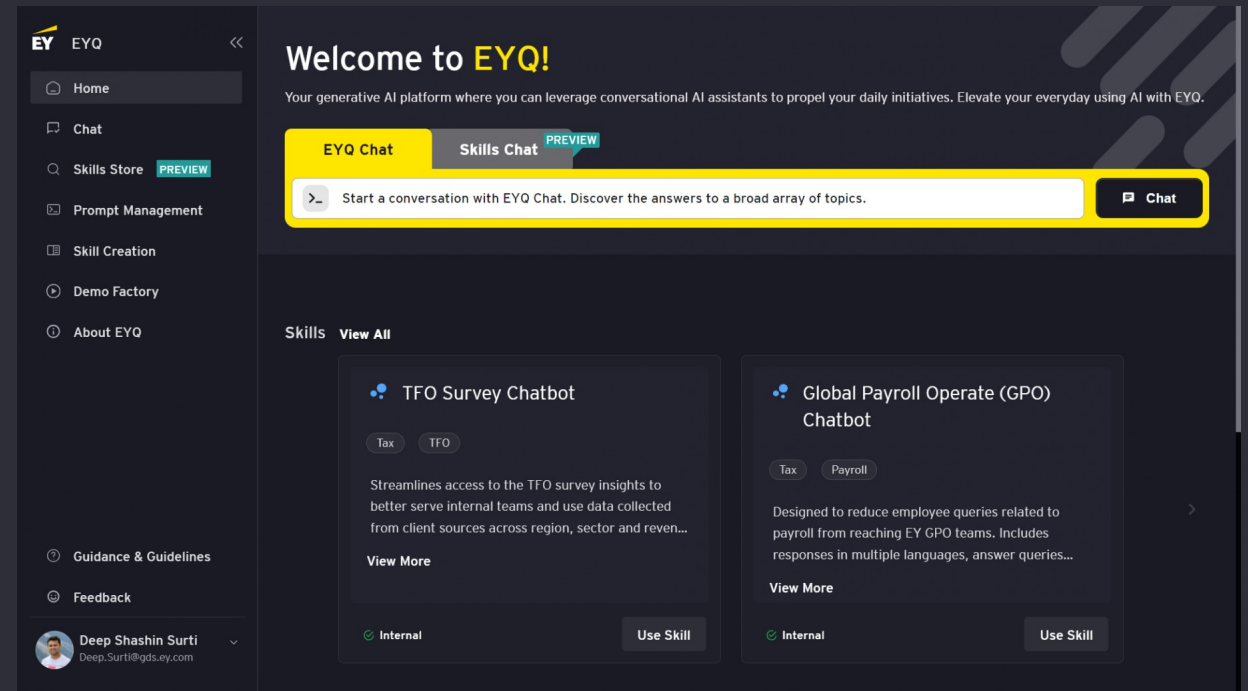


EY.ai – EYQ

EY.ai EYQ is an ecosystem of Generative AI (GenAI) capabilities, available to EY people, from general and domain specific conversational chat assistants (skills), prompt management to POC and solution development.

With access to the latest AI technologies and rigorous security measures, EYQ allows EY people to utilize a system that is constantly learning and improving from high-quality data. EYQ is here to support them in driving exponential value in their work and projects.

EYQ is the first global offering accessible on EY.ai. EYQ Chat is the first skill that was released on EYQ in Sept 2023.



EYQ's primary objective is to enable EY people with a self-service tool, powered by **the capabilities offered by GenAI**, in a private, secure environment, protecting EY brand and data. EY people are required to follow [EY guidelines](#) for use of EY.ai EYQ.

What is a **Skill** on EYQ?

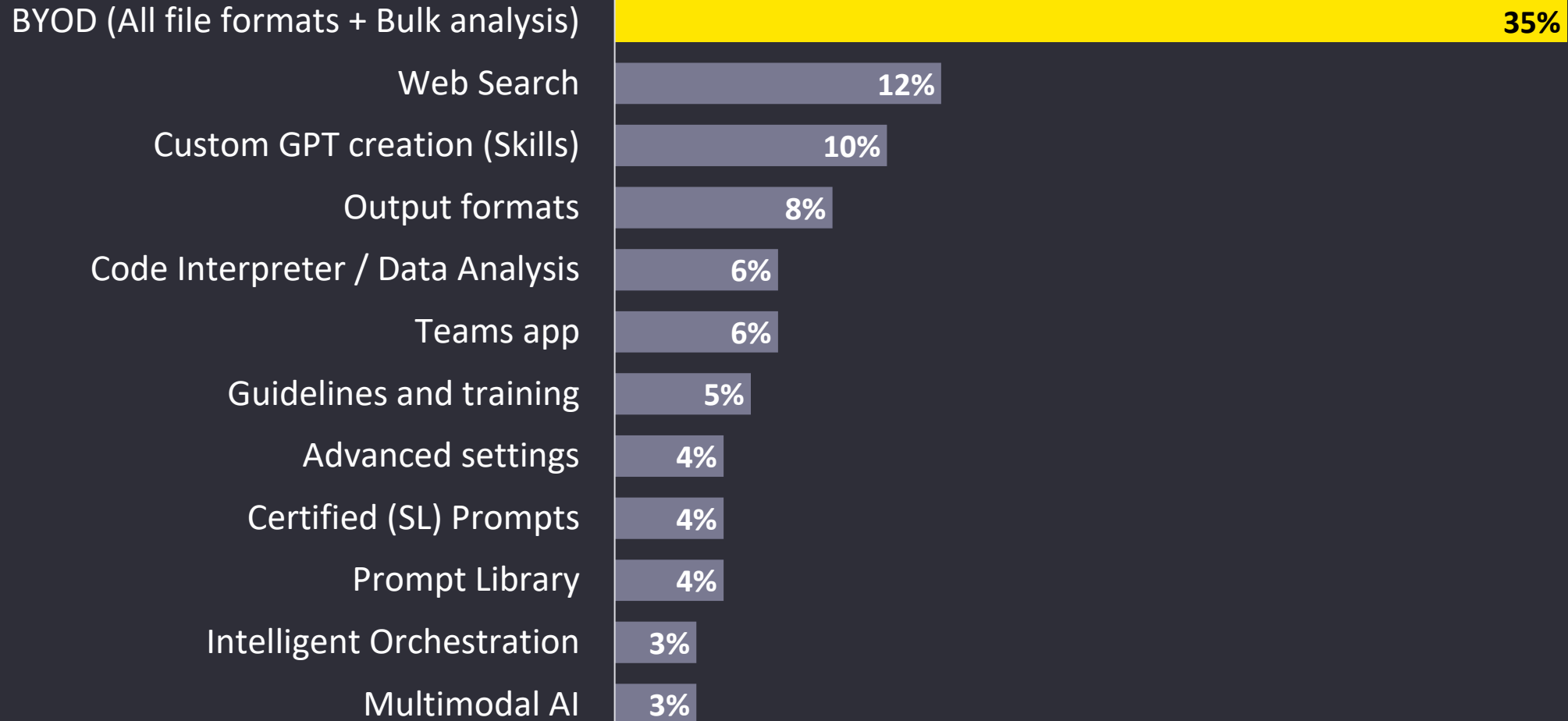
Custom version of EYQ, with a specialized “skillset” / purpose

- 1** **Instruction prompts.** What does this Skill do? How does it behave? What should it avoid doing?
- 2** **Knowledge.** Sources like PDFs, Templates, database connections, etc.
- 3** **Capabilities.** Web browsing, Code interpretation, File exports.



“Hi! I’m TaxGPT. How can I help you with your tax query today?”

Initial EYQ Chat **priority feature** view from the Tax Council



Payroll chatbot example

93%

First-time correct answer ratio

159

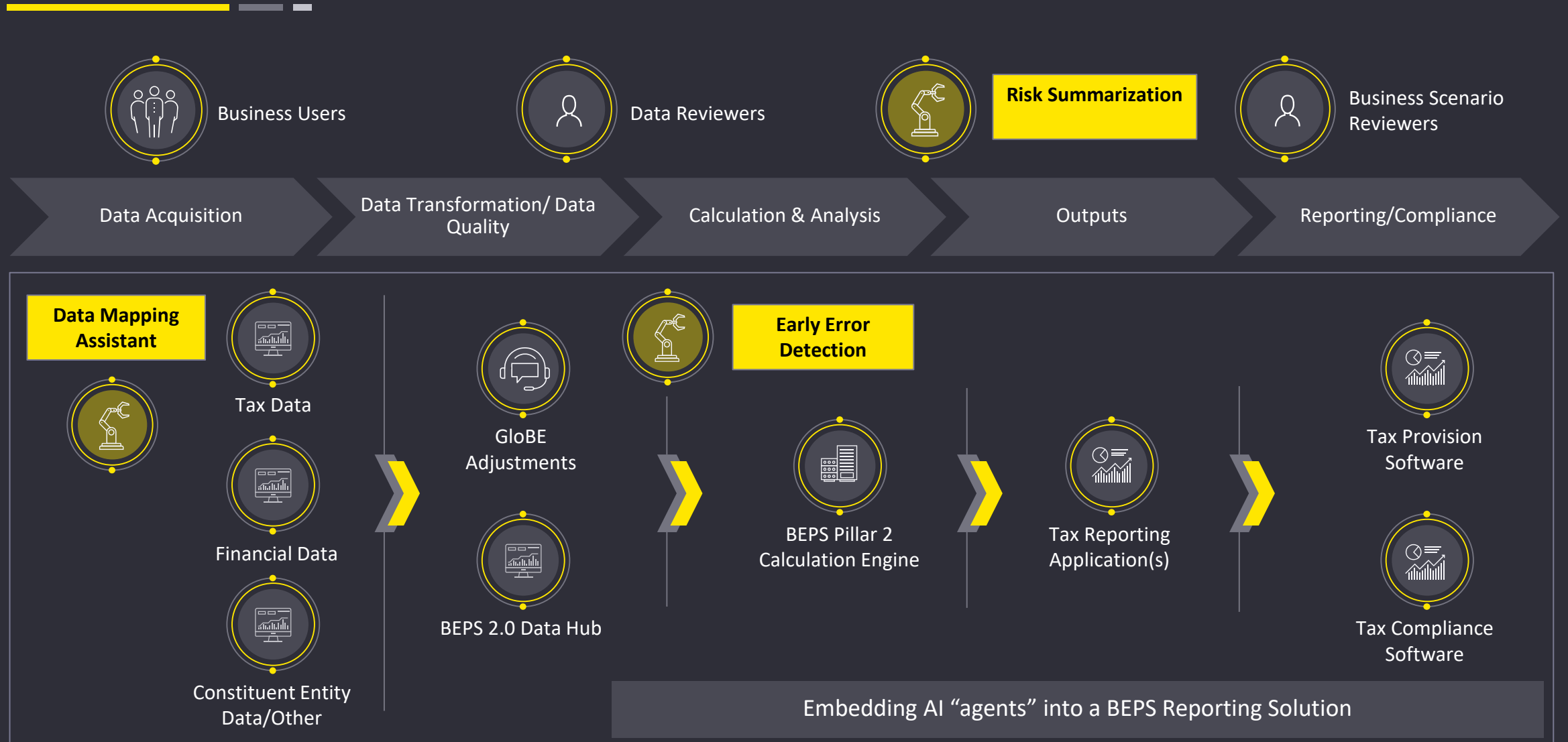
Countries
49 languages (natively)

50%

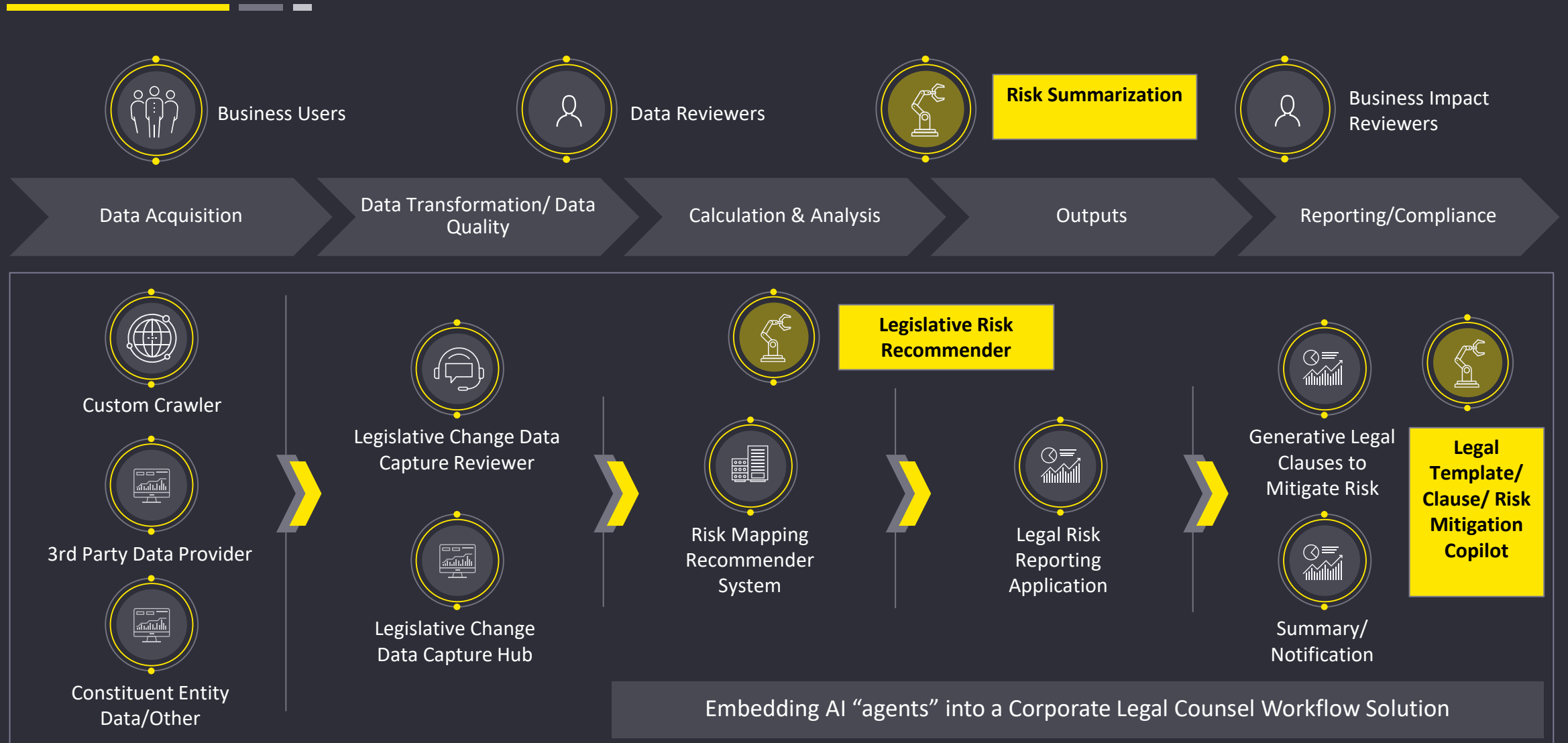
Burden reduction



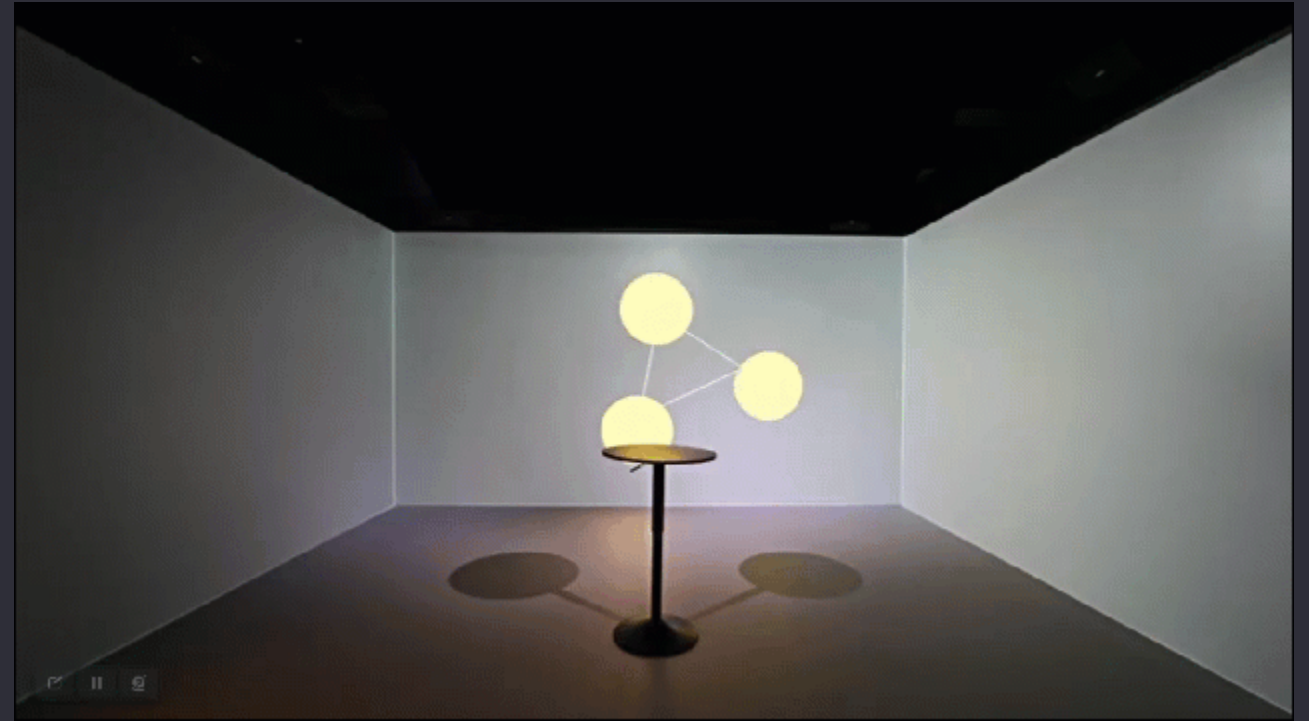
BEPS AI at a global investment bank



Tracking data privacy laws at a global technology company



Where is this all going? **Tax Immersive Experiences**



“The Sphere”

New York Tax AI Lab for
major i-banking client



04

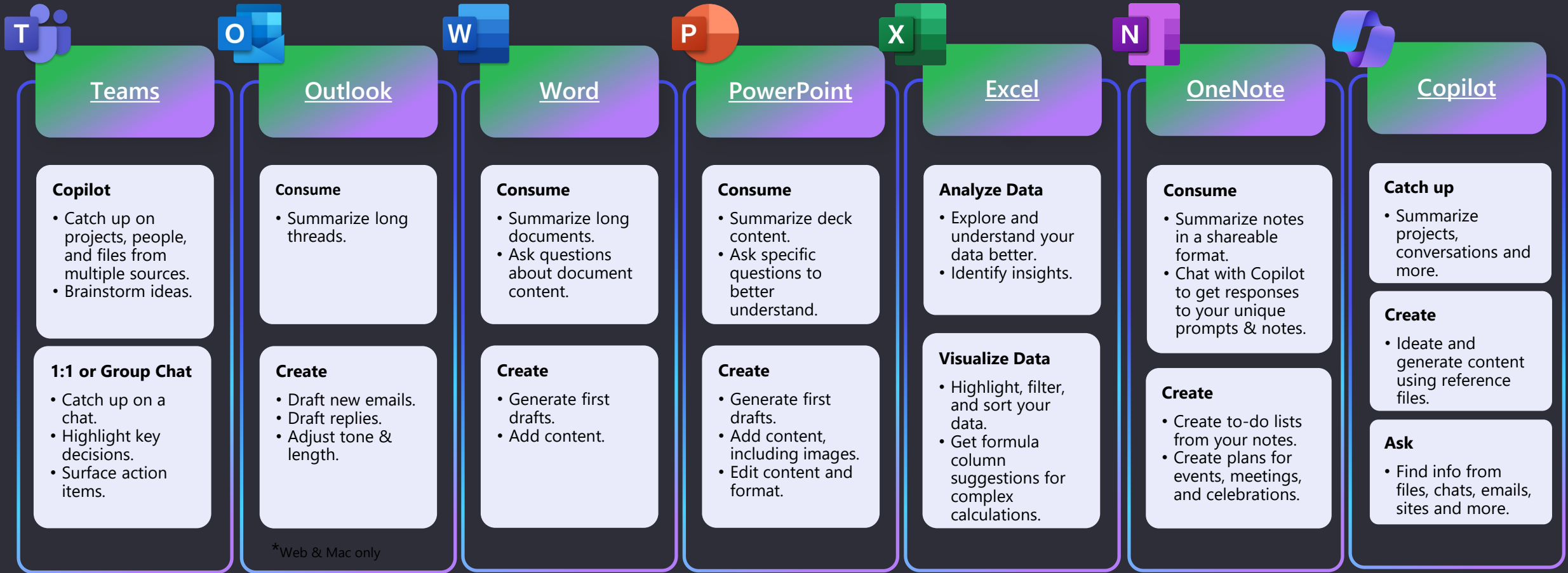
M365 Copilot





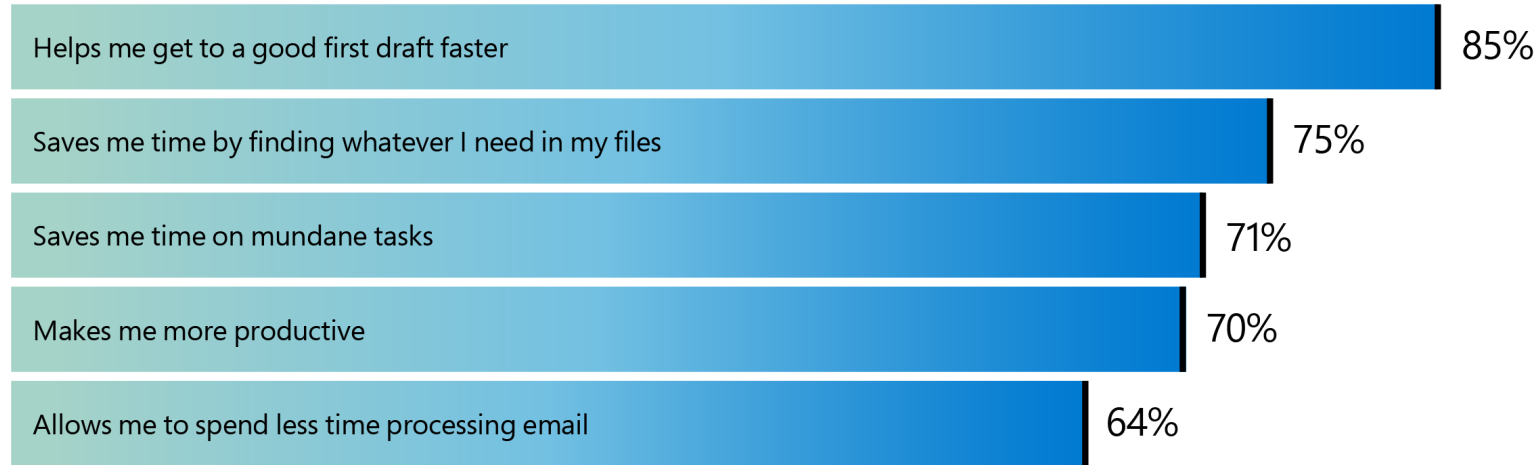


Some examples of what M365 Copilot can do today

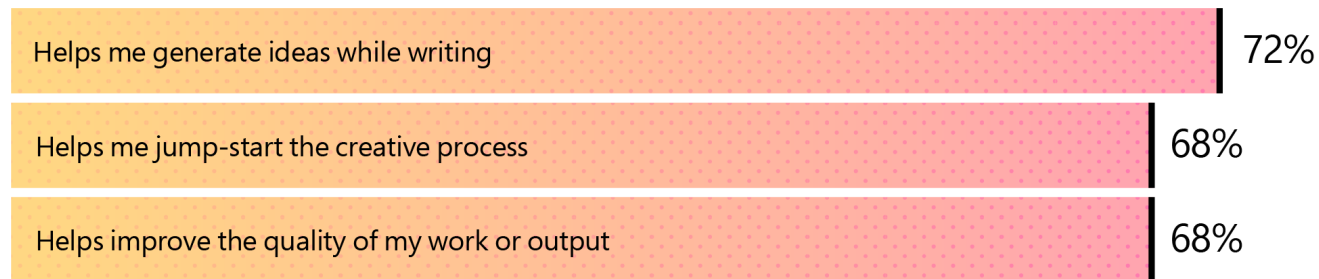


Copilot makes people more productive and creative, and saves time

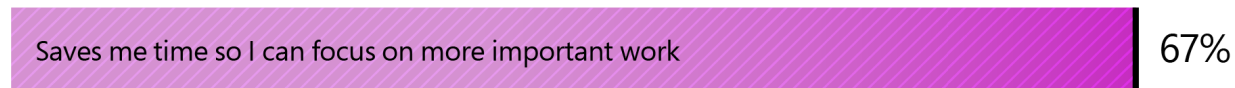
Productivity and speed



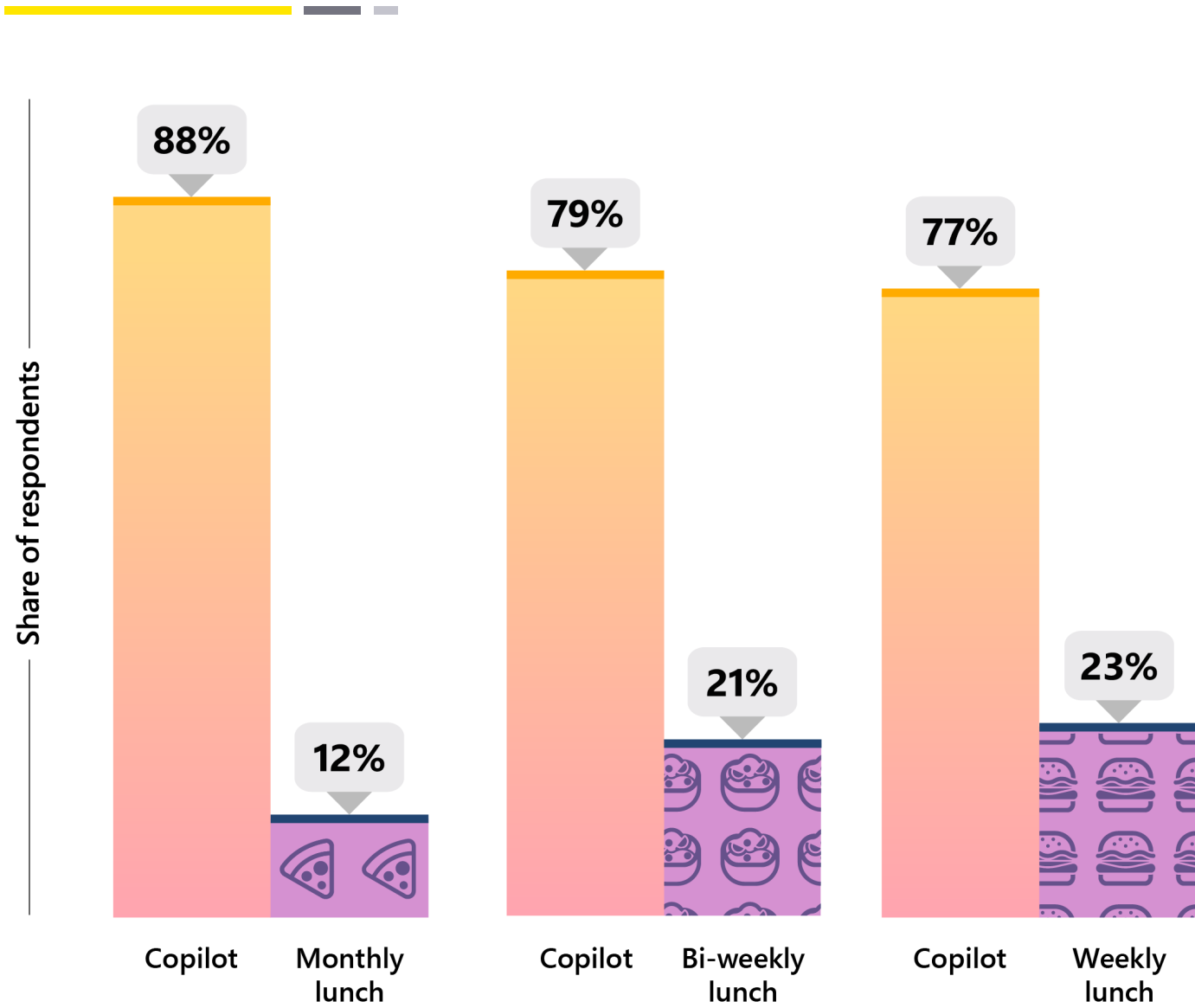
Quality and creativity



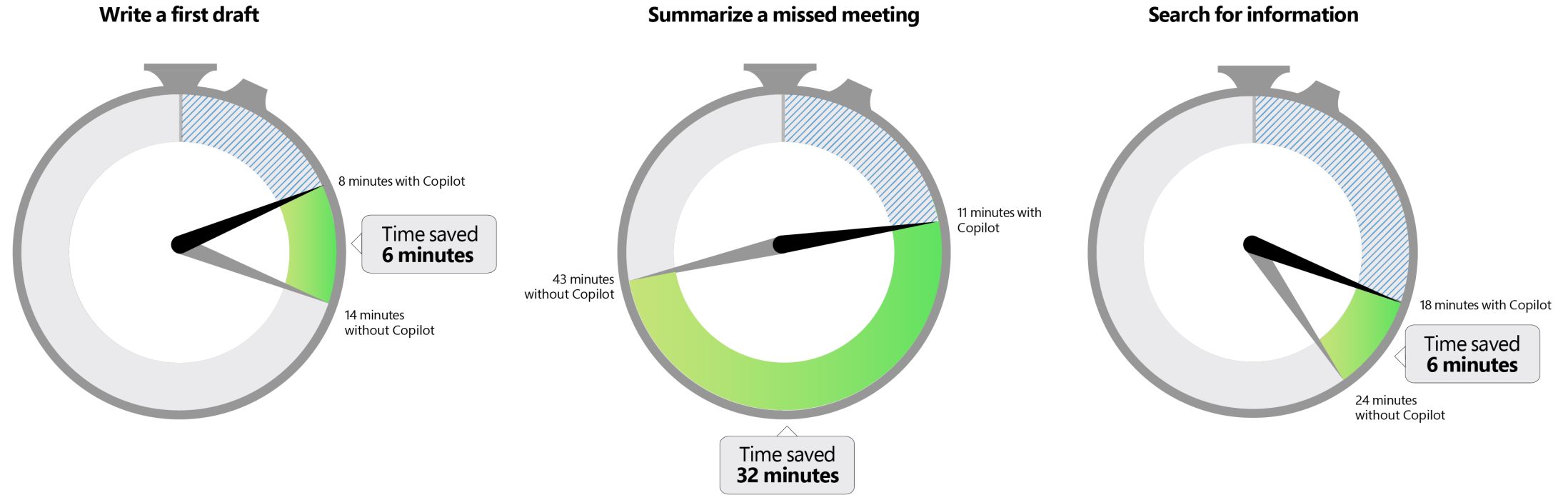
Focus time



Is Copilot worth more than a free lunch?



With Copilot, people save time on key tasks



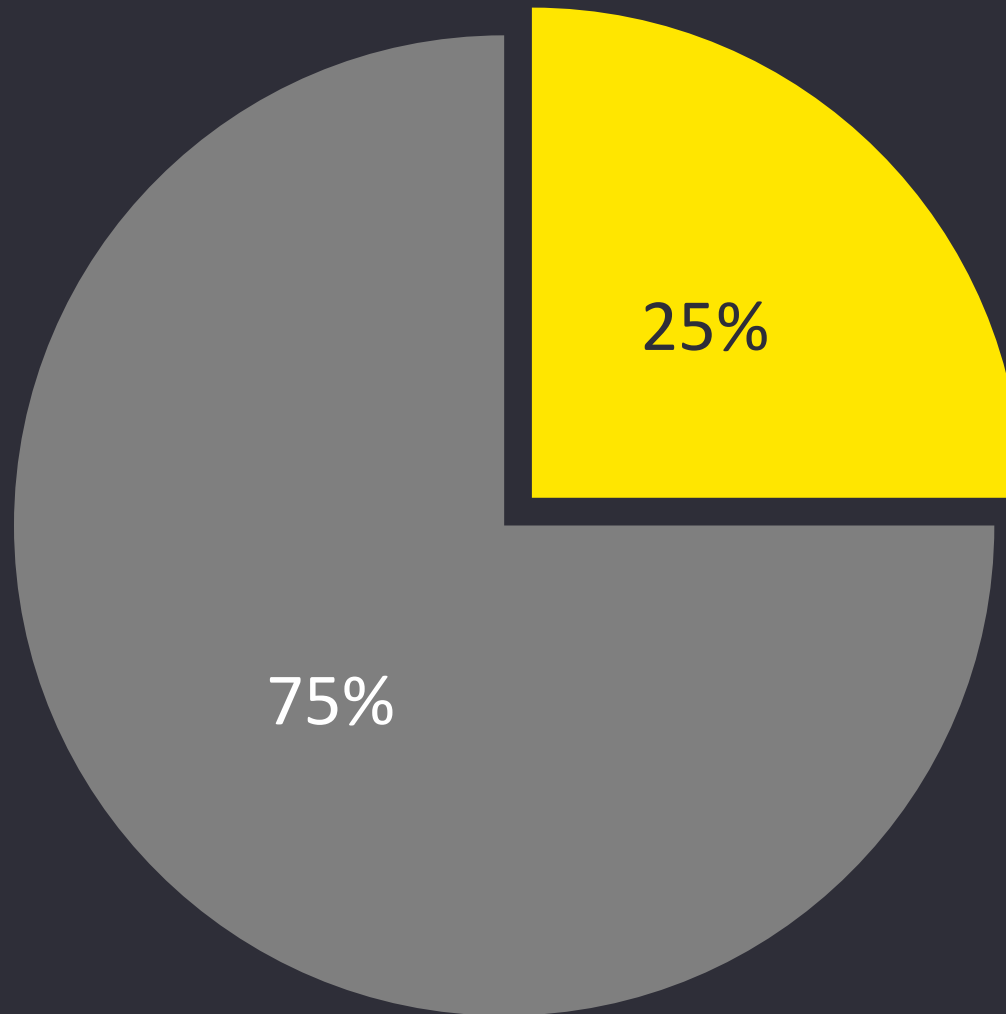
In three different studies, we divided participants into two groups, one with Copilot, and one without, and compared them as they completed assigned tasks. Writing study: draft a blog post. Meeting study: Summarize a 35-minute meeting recording. Search study: gather information from multiple sources, including files, emails, and calendars.

What do people spend their saved time on?



■ More work

■ Reducing stress, more creative activities, and collaborative working







05

The Fine Print



Some limitations / risks



Hallucination

AI will sometimes go off the rails trying to please you

FP PROMPT

Who was the sole survivor of the Titanic?



The sole survivor of the Titanic disaster was Charles Joughin. He was a British baker and the chief baker aboard the Titanic. Joughin managed to survive the sinking by reportedly....



Actuality

A lot happens in the world after the knowledge updates



Math

Can a chef do surgery because they know how to hold a knife?

FP PROMPT

Is 17077 a prime number?



Since 17077 is divisible by 7, it is not a prime number.

Some limitations / risks



Privacy / security

Can be a nightmare: make sure not to overshare



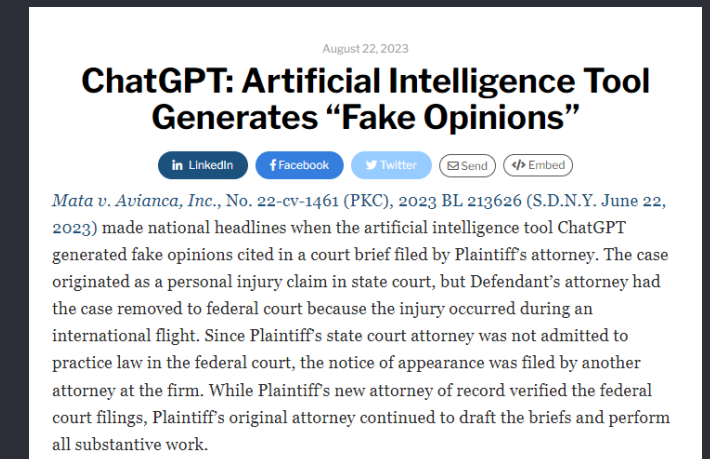
Bias / ethical concerns

It is a child of its generation and can reflect societal views



Legal / IP

Check your sources!



Create and destroy value in the professional services industry

+90%

Improved
performance

+40%

Creative product
innovation

-23%

Business problem
solving

Level the playing field (ranks + internal/external)







06

Prompt Engineering



We are knowledge workers (and now also sort of programmers...)

The better the question / *Prompt*

The better the answer / *Output*

The better the world works *With AI*

4 Guiding Prompt Principles



It's a
Copilot!
No Autopilot



Context
is King



Verify Results,
verify Results,
verify Results...



Interact for better
Results

Basic prompt engineering example: **Persona Prompt**

“You are TaxGPT, a tax advisor”
“You are LawGPT, a legal advisor”



Advanced prompt engineering example: **Meta Prompt**

“First, ask me what I want to do. Pause and wait for my answer. Ask questions to clarify as needed. Second, once you have the information suggest a prompt that includes context, examples, and chain of thought prompting where the prompt goes step-by-step through the problem. Third, show what your response as EYQ would be to the prompt. Fourth, ask if the user has any suggestions and help them revise the prompt”



Why prompt engineering is important



Wrong output

FP

When Alice was 10 years old, Bob was 2. Bob is now 32. How old is Alice?



If Bob is now 32 years old and he was 2 when Alice was 10 years old, this means there's an age difference of 8 years between them. If Bob is now 32, 30 years have passed since he was 2.

To determine Alice's age, the age difference of 8 years has to be added to the 30 years that have gone by.

So, Alice is now 38 years old.



Right output

FP

When Alice was 10 years old, Bob was 2. Bob is now 32. How old is Alice? Please calculate it step-by-step



When Alice was 10 years old, Bob was 2.

This means there's an age difference of 8 years between Alice and Bob:

$$10 - 2 = 8.$$

Bob is now 32. To find out how many years have passed since Bob was 2, we subtract 2 from 32:

$$32 - 2 = 30 \text{ years.}$$

To find out Alice's age now, we add the 30 years that have passed to her age when she was 10:

$$10 + 30 = 40.$$

So, Alice is now 40 years old.



It really works...

Impact on data quality metrics

+33%

Improved tax output
quality score

Prompt engineering methods

- Applied persona pattern
- Format/Output Instruction
- Chain-of-thought prompting
- Cognitive verifier questions





06

Next Steps



EY | Building a better working world

EY exists to build a better working world, helping to create long-term value for clients, people and society and build trust in the capital markets.

Enabled by data and technology, diverse EY teams in over 150 countries provide trust through assurance and help clients grow, transform and operate.

Working across assurance, consulting, law, strategy, tax and transactions, EY teams ask better questions to find new answers for the complex issues facing our world today.

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ED None

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ey.com

